

Appln. No. 10/582,889
Amtd. Dated September 23, 2008
Reply to Office Action of March 25, 2008

REMARKS

The Examiner has noted acceptance of the application under 35 USC §317 as a national stage application based on PCT/GB2004/005111.

The Examiner further notes that examination is based on claims contained in a Preliminary Amendment filed June 14, 2006, which included changes to conform to US dependency practice. These claims appear in the application publication US 2007/0217189 A1.

The drawings stand objected to under 37 CFR 1.83(a). In particular, the elliptical cross section recited in claim 5 is not shown. The feature must be shown in the drawings or cancelled from the claims.

Applicant has cancelled claim 5, thereby rendering this objection moot.

Claims 1, 2, 4, 6, 7 and 9 stand rejected under 35 USC §102(b) as anticipated by Hulse et al (US 6,550,952).

With respect to claim 1, the Examiner finds that Hulse et al discloses an illumination device comprising a first elongate translucent member (wave guide 10), an LED light source (16) located at least at one end of the first member to pass light into and along the member, a second translucent member (14) arranged in super imposed relationship with the first translucent member, thus to define a gas space therebetween; characterized by a surface formation (20a) on the first translucent member causing it, in use, to function as a leaky, wave guide allowing light to escape into the gas space for secondary diffusion therein, the second translucent member thus being adapted to pass the secondarily diffused light externally thereof (reference being made to Figs. 1-3 and column 4, line 44 through column 5, line 48).

With respect to claim 2, Hulse is cited as showing the first member (10) is a rod, and the second member (14) is a tube surrounding the rod and defining the gas space therebetween.

Regarding claim 4, Hulse is cited as showing the rod (1) being circular in cross section.

With respect to claim 6, Hulse is cited as showing a second embodiment in Fig. 3 wherein the LED light source comprises separate light sources (22) disposed at opposite ends respectively of the first translucent member.

With respect to claim 7, the Examiner finds Hulse discloses a reflector (reflecting tape 20a) disposed on a part of the surface of the first member (10). With respect to claim 9, Hulse is found to disclose member (10) made from acrylic or polycarbonate (reference being made to column 4, line 33).

The foregoing rejections are respectfully traversed in view of the amendments to claim 1 and the comments which follow.

In accordance with the present invention, light propagating in the rod is described as being "primarily diffused" by substantially total internal reflection. This is alternate phraseology for the phenomenon known as "forward diffusion". In forward diffusion, light is scattered by the amorphous nature of the acrylic rod such that it leaves the rod at low angles of projection with respect to the optical axis of the rod. Light that is not scattered out of the rod is retained within the rod by the process of internal reflection until it too is ultimately scattered or diffused out of the rod. Significantly, the level of volumetric scattering is low, such that the rod does not appear to be "milky" to the observer when illuminated, but is instead observed to be mostly transparent, albeit glowing with light.

Claim 1 has been amended to expressly recite the first member as comprising an elongate transparent member of material having substantially total internal reflection. Further, the claim also includes important recitation that light is propagated within the rod by "primary diffusion".

In Hulse, by comparison, there is no disclosure of either "forward diffusion", "primary diffusion", "internal scatter" or "volumetric scatter", all of which refer to the process by which light is scattered out from the volume of the rod. Instead, the primary light exit mechanism in Hulse is clearly due to the presence of a diffuse reflecting strip (or similar scattering device) on the rear surface of the rod. It follows,

therefore, that the rod in Hulse is optically transparent and that light is encouraged to leave the rod by, for example, reflection off the back surface of the wave guide. Hulse also describes certain optical features ("indicia") that are inscribed upon the surface of the rod such that they can be viewed by an external observer. Thus, the primary function of the rod in Hulse is to convey messages via the indicia inscribed on the rod surface.

In accordance with the present invention, the surrounding tube acts as a further source of forward scattering such that light exiting the rod by primary diffusion is further scattered to the task area or to the observer. To effect this function, the tube is translucent, but not transparent. The tube thus functions to provide optical scattering and converts the forward diffused light from the rod into light observable over a wide range of angles. The tube acts as a light scattering element due to the fact that it is clearly described as being "not transparent" in accordance with the amendment to claim 1. In this way, it is not possible for an observer to observe, read or discern any indicia located on the surface of the internal wave guide rod. In fact, this is not desired in the present invention, the purpose of which is to create a uniformly illuminated device.

In Hulse, by comparison, the functionality of the surrounding tube is described in several ways, including that of a mechanical shield and ultraviolet radiation shield. However, it is otherwise required to be optically transparent to the light exiting the rod at wave lengths of interest. This clear from the following excerpt from the Abstract wherein it is stated:

. . . indicia may be located within the treated portion of the rod or wave guide surface area so as to be illuminated and made visible to a viewer through the second surface area.

In summary, the first member is an elongate transparent member of a material having substantially total internal reflection of light. Light exits the elongate transparent member as primary diffusion. This is a volumetric scattering mechanism. In Hulse, light is directed out of the rod by diffuse reflection and there is no disclosure of volumetric scattering properties such as those that give rise to forward diffusion. Indeed, volumetric scattering would appear to militate against the functionality of Hulse given

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that there is a desire for an observer to be able to see directly through the transparent tube and a transparent rod.

In accordance with the present invention, the second elongate member (e.g. tube) is translucent, but not transparent. This is indicative of a strongly optically scattering device. Features present on and within the enclosed wave guide rod cannot be discerned by an observer, and in the case of surface features such as light scattering dryations, preferably so. Hulse, by comparison, describes the surrounding tube as being transparent to the extent that features can be discerned as being present on the surface of the rod. The tube does not act as a scattering medium and is thus not essential in optical terms.

In summary, in view of the amendments to claim 1, all of claims 1, 2, 4, 6, 7 and 9 are now believed to be allowable.

Claim 3 stands rejected under 35 USC §103(a) as unpatentable over Hulse et al in view of Levinson et al (US 6,299,338).

Claims 5 and 10 stand rejected under 35 USC §103(a) as unpatentable over Hulse et al. Claim 5 has been cancelled.

Claims 8, 14 and 15 stand rejected under 35 USC §103(a) as unpatentable over Hulse et al in view of Sugiyama et al (US 5,982,969).

Claims 11 and 16 stand rejected under 35 USC §103(a) as being unpatentable over Hulse et al in view of Oyama (US 5,233,679).

Claim 12 stands rejected under 35 USC §103(a) as unpatentable over Hulse et al and Oyama and further in view of Yamamoto et al (US 6,601,984).

Claim 13 stands rejected under 35 USC §103(a) as unpatentable over Hulse et al in view of Strack et al (US 3,901,674).

Claim 17 stands rejected under 35 USC §103(a) as unpatentable over the combination of Hulse et al/Oyama/Yamamoto et al in further view of Kuo (US 2004/0075994).

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The Examiner has set forth in detail his support for each of the §103(a) rejections above. However, these claims are deemed to be allowable along with amended claim 1 for the reasons set forth above.

Amended claim 1 and dependent claims 2-4 and 6-17 are believed to be in condition for allowance and further favorable action is respectfully requested.

Respectfully submitted,

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